UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, July 2020

Course: Hazard Identific. Risk Analysis & Mgmt. – HSFS 7011   **Semester: II**
Programme: MTech (HSE and HSE with Sp. In DM)   **Time: 03 hrs.**
Max. Marks: 100

100 MCQ - Each question carries equal marks

1. What is the main purpose of hazard identification?
   a) To minimise the effect of a consequence
   b) For better risk management
   c) To characterize adverse effect of toxins
   d) To reduce probability of occurrence

2. The _____ process determines whether exposure to a chemical can increase the incidence of adverse health effect.
   a) Hazard identification
   b) Exposure assessment
   c) Toxicity assessment
   d) Risk characterization

3. Which of the following data is not required for hazard identification?
   a) Land use
   b) Contaminant levels
   c) Affected population
   d) Estimation of risk

4. Hazard is defined as the probability of suffering harm or loss.
   a) True
   b) False

5. Why does site history have to be considered for hazard identification?
   a) To estimate the risk
   b) To calculate carcinogenic exposure
   c) To know the probable source and causes of contamination on site
   d) For determination of remedial actions

6. What is the main objective of risk assessment?
   a) To evaluate hazard and minimize the risks
   b) Remediation of contaminated sites
   c) Hazard management
   d) To know source of pollutants

7. What is the first stage of risk assessment?
   a) Exposure assessment
   b) Hazard identification
   c) Toxicity study
   d) Risk characterization

8. An incident can be called hazardous only when?
   a) Stressor has the potential to cause harm to humans and ecological systems
   b) Poses threat to surrounding
   c) Monitoring is failed
   d) Outburst of chemicals

9. The purpose of risk management is to identify potential problems before they occur so that risk-handling activities may be planned.
   a) False
   b) True

10. Hazard identification mainly focus on _____
    a) Chemical source and concentration
    b) Chemical exposure
    c) Chemical analysis
    d) Chemical pathway

11. What is the full forms of ERPG.
    a. Emergency Replay Planning Guidelines
    b. Emergency Response Planning Guidelines
    c. Emerging Response Planning Guidelines
    d. Emergency Response Play Guidelines

12. What is the full forms of TLV
    a. Threat Limit Value
    b. Throttling Length Valve
    c. Threshold Limit Value
    d. Threshold Lower Value

13. What is the full forms of HAZOP
    a. Hazard and Operability Study
    b. Hazard and Operation Study
    c. Haze and Operability Study
    d. Hazard and Operability Stint

14. What is the full forms of ALOHA
    a. Area Local to Hazardous Atmospheres
    b. Areal Locations of Hazardous Atmospheres
    c. Areal Low Hazardous Atmospheres
    d. Areal Locations of Hazardous Aerosol

15. What is the full forms of HIRA
    a. Hazard Identity and Risk Analysis
    b. Hazard Identification and Risk Asset
    c. Hazard Identification and Risk Assessment
    d. Hazard Identification and Risky Asset

16. What is an explosion-hazardous environment?
    a. An environment with too much gas and too little air.
    b. An environment where many explosions happen.
    c. An environment in which an explosive mixture can arise.

17. What is the LEL (Lower Explosion Limit) of a gas?

a.   The highest concentration of the gas at which an explosion can occur.
b.   The lowest concentration of the gas at which an explosion can occur.
c.   The lowest measurable concentration of the gas.

18. Every risk has 100% likelihood. True or false.
   a. True
   b. False

19. Events Tree Analysis is

   a.   A Christmas Event
   b.   a structured and systematic technique for system examination and risk management
   c.   the identification and analysis of conditions and factors that cause or may potentially cause or contribute to the occurrence of a defined top event
   d.   an inductive logic technique to model a system with respect to dependability and risk related measures as well as to identify and assess the frequency of the various possible outcomes of a given initiating event

20. Who should undertake the risk assessment?
   a.   Operator
   b.   A competent person
   c.   The manager
   d.   An employee

21. Fault tree analysis (FTA) is a systems analysis technique used to determine
   a.   the root causes and probability of occurrence of a specified undesired event.
   b.   the outcome and probability of failure.
   c.   the initiating event and probability of fatality.
   d.   the consequence and failure frequency

22. Hazardous areas are classified into zones based on an assessment of the frequency of the occurrence and duration of an explosive gas atmosphere. Zone 0 is an area _____

   a.   An area in which an explosive gas atmosphere is likely to occur in normal operation; (> 10, but < 1000 h/yr)

   b.   An area in which an explosive gas atmosphere is not likely to occur in normal operation and, if it occurs, will only exist for a short time. (<10h/yr)

   c.   An area in which an explosive gas atmosphere is present continuously or for long periods; (> 1000h/yr)

   d.   An area in which an explosive gas atmosphere is not likely to occur in normal operation and, if it occurs, will only exist for a short time. (>5000h/yr)

23. Release rate calculated using the formula given in IEC 60079-10-1 depends on:
   a.   Geometry
   b.   Release velocity
   c.   Concentration
   d.   All of the above

24. Full form of IPL
   a.   Independent Protection Layer
   b.   Indian Premier League
   c.   Inter Plant Lane
   d.   Interconnected Piping Length

25. P&ID stands for?
   a.   Process & Information diagram

b. People & Instrumentation diagram

c. Piping & Information drawings

d. Piping & Instrumentation diagram

26. In a process flow diagram (PFD), number streams from _____ as much as possible.

    a. Left to right
    b. Right to left
    c. Top to bottom
    d. Bottom to top

27. Common synonym for P&ID:

    a. Engineering Flow Diagram
    b. Utility Flow Diagram
    c. Mechanical Flow Diagram
    d. All of the above

28. A credible accident is defined as

    a. the accident which is within the realm of possibility (i.e., probability higher than 1×10^6/yr) and has a propensity to cause significant damage (at least ten fatality)
    b. the accident which is within the realm of possibility (i.e., probability higher than 1×10^{-16}/yr) and has a propensity to cause significant damage (at least two fatality)
    c. the accident which is within the realm of possibility (i.e., probability higher than 1×10^{-6}/yr) and has a propensity to cause significant damage (at least one fatality)
    d. the accident which is within the realm of possibility (i.e., probability higher than 1×10^{-6}/yr)

29. Which of the following statement is correct for a Bow-Tie diagram

    a. A bow-tie diagram has fault tree on the left-hand side and an event tree on the right-hand side
    b. A bow-tie diagram has fault tree on the right-hand side and an event tree on the left-hand side
    c. Bow-tie diagram is named bow-toe because it is done by a competent person wearing bow-tie
    d. None of the above

30. Wind conditions are generally reported at a height of _____ m

    a. 11
    b. 12
    c. 10
    d. 5

31. In deflagration the flame front moves at

    a. Subsonic velocity
    b. Supersonic velocity
    c. Sonic velocity
    d. None of the above

32. Detonations in hydrocarbon vapour cloud are rare, following is/are the past accident where generated overpressure point to the possibility of a detonation in vapour cloud

    a. Buncefield, UK
    b. Port Hudoson, Missouri
    c. Both (a) and (b)
    d. None of the above

33. Which of the following is(are) physical hazard agent(s)?

    a. Falls
    b. Electricity
    c. Inhalation
    d. All of the above

34. A pool fire is

    a. Buoyancy driven
    b. Momentum driven
    c. Fuel driven
    d. Smoke driven

35. Jet Fire is
    a. Buoyancy driven
    b. Momentum driven
    c. Fuel driven
    d. Smoke driven
36. BLEVE is a
    a. Chemical explosion
    b. Rapid phase transition
    c. Physical explosion
    d. Run away reaction
37. PHA is generally performed during early stage of process design
    a. True
    b. False
38. Performing HAZOP does not require any competence and it can be done by a single person
    a. True
    b. False
39. Which of the following is not a guide word in HAZOP study?
    a. More of
    b. Less of
    c. Get under
    d. Reverse
40. Which technique used RPN
    a. FEMA
    b. PHA
    c. What-If analysis
    d. FTA
41. Which symbol is used to represent a basic or primary failure event in a fault tree?
    a. Square
    b. Dimond
    c. Circle
    d. Triangle
42. Information about hazardous materials is given by
    a. Manager
    b. Safety officer
    c. MSDS
    d. PPE
43. What does What-If analysis involve
    a. Idea generation
    b. Innovation
    c. Chat
    d. Brainstorming
44. Which toxic chemical vapour was released in Bhopal gas tragedy?
    a. Methyl isocyanate
    b. Methyl tetrachloride
    c. Chlorine trifluoride
    d. Cyanide
45. An FMEA is efficient for identifying an exhaustive list of combinations of equipment failures that lead to accidents
    a. True
    b. False
46. Which of the following type of fire results from loss of containment in process industry?
    a. Kitchen fire

b. Type A
c. Jet fire
d. Bonfire

47. Vapour cloud explosion is dangerous as it can lead to high overpressures in open spaces
    a. True
    b. False

48. The magnitude of the explosion energy is used to determine
    a. The strength of the blast wave
    b. The mass and velocity of the projectiles resulting from the explosion
    c. Both (a) and (b)
    d. None of the above

49. A flash fire will happen if and only if the vapour cloud is diluted below the LFL limit
    a. True
    b. False

50. Which of the following does not consider the presence of confinement as a necessary condition for VCE?
    a. TNT equivalency models
    b. TNO Multi-energy models
    c. Baker-Strehlow models
    d. None of the above

51. The TNO multi energy model treats the hemispherical cloud as a homogeneous, stochiometric mixture of flammable gas and air with a combustion energy of _____ MJ/m^3
    a. 3.5
    b. 2.5
    c. 1.5
    d. 0.5

52. Baker-Strehlow model is similar to TNO in which of the following aspect
    a. The VCE is assumed to occur only within the mass of flammable cloud that is partially confined
    b. Method of determining explosion energy is the same
    c. Scaled distance vs overpressure curves are used
    d. All of the above

53. BLEVE is always accompanied by a fireball
    a. True
    b. False

54. BLEVE can happen in
    a. Boilers
    b. LPG
    c. CNG
    d. Both (a) and (b)

55. The determination of the thermal effects depends on
    a. Type of fuel
    b. Geometry of the pool
    c. Duration of the fire
    d. All of the above

56. The effect of pool fires is local radiation whereas effect of jet fire is not localized
    a. True
    b. False

57. TEEL stands for
    a. Temporal Emergency Explosion Limits
    b. Temporary Emergency Exposure Limits
    c. Temporary Emergency Example Limits
    d. Temporary Emergency Exposure Limitations

58. If Bhopal gas tragedy had happened on a summer afternoon, the number fatalities would have

a. Increased
b. Decreased
c. Remined same
d. None of the above

59. The essence of the inherently safer approach to plant design is
    a. avoidance of hazards
    b. control by added-on protective equipment
    c. Both (a) and (b)
    d. None of the above

60. Which of the following is not an inherently safer design strategy?
    a. Substitute
    b. Minimize
    c. Use of PPE
    d. Moderate

61. Inherently safer design can be easily incorporated in
    a. Plant in early design stage
    b. An existing plant
    c. Plant ready for start-up
    d. A plant that is near its end of life

62. Process safety is the same as personal safety.
    a. True
    b. False

63. Process safety costs lots of money and has a negative effect on the company's profits.
    a. True
    b. False

64. Process safety is the responsibility of
    a. Safety officer
    b. Plant manager
    c. Operator
    d. All of the above

65. What are the characteristics of a good experimental characterization methods?
    a. Must use small quantities in a laboratory to perform the experiment safely.
    b. Must use large quantities in a laboratory to perform the experiment safely.
    c. Characterization must be representative of a pilot plant reactor
    d. None of the above

66. Typical Chemical Hazards include:
    a. Toxic
    b. Flammable
    c. Reactive
    d. All of the above

67. What control is used to avoid injection of toxins through cut in skin
    a. Rules on eating
    b. Ventilation
    c. Hoods
    d. Protective clothing

68. What is the knowledge required to prevent fire and/or explosion?
    a. Material properties
    b. Nature of fire and explosion process
    c. Procedures to reduce hazards
    d. All of the above

69. Which of the following is NOT an oxidizer?
    a. Oxygen

b. Chlorine

c. Peroxides

d. None of the above

70. Carbon disulfide fire is flameless and smoke less.

    a. True

    b. False

71. Auto-Ignition Temperature is

    a. Temperature above which a liquid produces enough vapor to form an ignitable mixture with air.

    b. Temperature above which adequate energy is available in the environment to provide an ignition source.

    c. Temperature above which a solid undergoes pyrolysis to produces enough vapor to form an ignitable mixture with air.

    d. None of the above

72. The upper and lower oxygen limits (%) for Hydrogen are:

    a. 5.1 and 61

    b. 3.0 and 66

    c. 4.0 and 94

    d. 3.0 and 80

73. Which of the following VCE models should be used with caution for estimation of near field overpressures?

    a. Baker-Strehlow

    b. TNT

    c. TNO

    d. None of the above

74. The discharge rate from a source is dependent on which of the following parameters

    a. the hole area

    b. the pressure within and outside the tank

    c. the physical properties of the gas

    d. All of the above

75. A highly hazardous chemical is a substance possessing toxic, reactive, flammable, or explosive properties as specified by section _____OSHA

    a. 1910.119(a)(1)

    b. 1910.1200

    c. 1910.119(h)

    d. 1910.119(g)

76. OSHA's section 1910.119(p) for trade secret

    a. Empowers the employer not to share process hazard and other safety information with the employee

    b. The rule permits employers to enter into confidentiality agreements to prevent disclosure of trade secrets.

    c. Ensures that the employee cannot access the safety related information.

    d. Enables the employer to fire the employee without giving notice

77. As per OSHA how many elements are there in a Process Safety Management System

    a. 14

    b. 22

    c. 16

    d. 18

78. Failure probability and reliability are related to each other as per the following expression

    a. $P(t) = R(t) - 1$

    b. $P(t) = 1 - R(t)$

    c. $P(t) = 1/R(t)$

    d. $P(t) = R(t)$

79. The area under a complete failure density function is always

    a. 1

    b. 0.1

    c. 10

    d. 1.1

80. Mean Time Between Failure is
    a. The time interval between two failures of the component
    b. The time interval between two accidents
    c. The time interval between three failures of the component
    d. The time interval between replacement of a component

81. In a P&ID, instruments which are field mounted are represented by a
    a. Dashed Circle
    b. Solid circle
    c. Circle with a solid line running through its diameter
    d. Circle with a dashed line running through its diameter

82. In a P&ID, the ZZ in a instrument numbering represented by XYY CZZLL is
    a. Process variable to be measured.
    b. Type of instrument
    c. Process unit number
    d. Loop number

83. Which of the following is not the example of use of Ratio control loop in a process?
    a. Blending two or more flows to produce a mixture with specified composition.
    b. Blending two or more flows to produce a mixture with specified physical properties.
    c. Maintaining correct air and fuel mixture to combustion.
    d. Adjust the Flow rate of coolant to maintain temperature in a reactor

84. What is/are the advantage of using cascade control?
    a. Allow faster secondary controller to handle disturbances in the secondary loop
    b. Allow secondary controller to handle nonlinear valve and other final control element problems
    c. Both (a) and (b)
    d. None of the above

85. Fire Dynamics Simulator (FDS) is a computational fluid dynamics (CFD) model of fire-driven fluid flow. The model solves numerically a form of the Navier-Stokes equations appropriate for
    a. low-speed, thermally-driven flow with an emphasis on smoke and heat transport from fires.
    b. high-speed, thermally-driven flow with an emphasis on smoke and heat transport from fires.
    c. supersonic-speed, thermally-driven flow with an emphasis on smoke and heat transport from fires.
    d. modelling only solid fires.

86. The input file for use with Fire Dynamics Simulator has the extension
    a. .exe
    b. .bat
    c. .fds
    d. .net

87. In FDS it is important to explicitly define all the boundaries acting as walls in a room
    a. True
    b. False

88. Character strings used in FDS input file
    a. Must be in lower case letters
    b. Must be in upper case letters
    c. Is not case sensitive
    d. Is case sensitive

89. The Check list used in hazard identification is the list of (choose the most appropriate answer)
    a. Items to be procured for setting up a plant
    b. Items that need maintenance
    c. Items that are not required anymore
    d. Items that need to be check for compliance with the set standards

90. Deflagration and Detonation refer to the same type of explosion
    a. True

b. False
91. Which of the following statement is true?
    a. Maintenance plays no role in safety of a plant
    b. Risk management is important to gain confidence of all the stake holders
    c. HAZOP can be performed even if details of a plant are missing
    d. HIRA stands for Hero in risk assessment
92. Past accident analysis is done
    a. To stop repetition of similar accidents in future
    b. To understand the root cause of an accident
    c. To gather data which is otherwise very difficult to generate in controlled laboratory environment
    d. All of the above
93. Follow up and continual improvement is not essential for improving safety
    a. True
    b. False
94. What is the role of turbulence in explosion?
    a. It ensures that over pressure does not exceed beyond a certain limit
    b. It is used to estimate the thickness of blast wall
    c. It enables better fuel-oxidant missing thereby increasing rate of combustion resulting in generation of higher overpressures.
    d. Turbulence is not important
95. Which of the following is less quantifiable benefit of an effective Safety Management System?
    a. Fewer incidents and injuries
    b. Less severe injuries
    c. Fewer work-related fatalities and disease
    d. More community support and engagement
96. Dust explosion are not a concern in process industry
    a. True
    b. False
97. One of the methods used for making a process inherently safer is 'simplify'. It means that
    a. Do not worry much about safety, what is bound to happen will happen.
    b. Keep it simple and don't bother much about using PPEs
    c. Design facilities which eliminate unnecessary complexity and make operating errors less likely.
    d. None of the above
98. Risk can be reduced by
    a. Taking measures to reduce the frequency of occurrence of an accident
    b. Taking measures to reduce the severity of the outcome of an accident
    c. Both (a) and (b)
    d. None of the above
99. Toxic release can not result in domino accident
    a. True
    b. False
100.   An accident is the _____ in an _____ process.
    a. end results, expected outcome
    b. final event, unplanned
    c. unexpected outcome, unexpected happening
    d. a planned, expected happening